REMARKS

This amendment is submitted to be fully responsive to the outstanding Office Action. Claims 32 and 51 have been withdrawn from consideration pursuant to a restriction election already made of record.   Claim 52 has been canceled as directed to an omnibus claim inconsistent with USPTO practice. By way of this amendment claim 1 has been amended to state with greater clarity usage of physical characterization input variables as independent training variables while the outcomes or scores for each of the crystallization experimental samples represents dependent variables and that such dependent and independent variables are used to determine an optimal physical characterization parameter.   Support for these amendments to claim 1 is found in the specification as filed at page 16, lines 6-11. Likewise, independent claim 35 has been amended to clarify the operational input for crystallization parameter optimization, support for such amendments being found in the claims as filed, as well as page 16, lines 6-11. As such, it is submitted that no new matter has been added to the application by way of this amendment.

With the cancellation of claim 52, the rejection thereof under 35 U.S.C. §112, second paragraph, is moot. Currently, claims 1-16, 18, 19, 21-29, 31 and 33-50 stand rejected under 35 U.S.C. §102(e) as anticipated by Levinson (US 2002/0177167). Additionally, claims 33-50 stand rejected under 35 U.S.C. §102(b) as anticipated by Gester (WO 99/04361) using US 6,529,612 as an equivalent thereof. Lastly, claims 17, 20 and 30 stand rejected under 35 U.S.C. §103(a) over Levinson in view of admitted prior art found on page 15 of the specification and page 24 of the specification, specifically including Moloshok et al. and Carter Jr. et al.

Remarks Directed to Rejection of Pending Claims 1-16, 18, 19, 21-29,
31 and 33-50 under 35 U.S.C. §102(e) as Anticipated by Levinson

It is a well-established tenet of patent law that for a reference to anticipate a patent claim, all limitations of the claim must be disclosed within that reference as laid out in the claim.

Applicant submits that the claimed invention recites training a predictive crystallization function according to claim 1 that entails a degree of learning according to an inventive process that is neither taught nor contemplated by Levinson. The value of learning aspects of an inventive predictive crystallization function relative to Levinson is highlighted in Example 1 of the instant specification (page 24, line 4 – page 30, line 13) in which a mere 315 experiments out of a possible 328,050 permutations were sufficient to train a predictive crystallization function which in this case was a neural network (page 29, lines 2-4). The ability to achieve such a rapid optimization of physical crystallization of parameters is submitted to be nowhere found in Levinson and as such Levinson is submitted as not being anticipatory of the pending claims. Implicit in the training of the claim predictive crystallization function is the use of physical characterization input variables as independent training variables in the outcome or score for each of the crystallization experimental samples being a dependent variable. Both independent and dependent variables are used by the claim predictive crystallization function to determine the optimal physical characterization parameter.

As Levinson is wholly lacking as to a teaching commensurate with the scope of pending claim 1, it is submitted that Levinson fails to anticipate independent claim 1 and those claims that depend therefrom.

Additionally, no outstanding citation is found within Paper No. 02232006, top of page 4, identifying Levinson as teaching a neural network with reference to paragraphs [0004], [0019]-

[0025], and [0039] as well as with reference to Fig. 6 detailing computer clusters, Applicant

submits that the analysis cluster (602) of Fig. 6 is nowhere in Levinson detailed as having the

properties of learning consistent with either the training a predictive crystallization function per

claim 1 or the neural network embodiment thereof detailed with respect to claim 2.

Pending claims 5 and 6 recite that the number of experimental samples performed in

determining the optimal physical crystallization parameter is less than 5% and 0.1% of the total

crystallization experiment permutation number, respectively. Applicant submits that Levinson

fails to teach the percentage of samples relative to a total experimental permutation space that

must be performed to obtain an optimal physical characterization parameter. In fact, as well

summarized with respect to claim 2, Levinson never actually obtains an optimal physical

crystallization parameter but rather uses a first collection of experimental results to initiate a

second collection of experimental results without ever actually providing such a set of

parameters to a user. As such, it is submitted that the subject matter of claims 5 and 6 is

patentably distinct relative to Levinson regardless of dependency from claim 1 which is now

believed to be novel over Levinson. Should the rejection of claim 5 and 6 be maintained, it is

respectfully requested that the relevant teachings of Levinson be recited with greater clarity.

Claim 8 recites that the predictive crystallization functions trains through back

propagation. The methodology of back propagation is detailed in the instant specification at

page 19, lines 7-21. As back propagation as a training technique operates only within neural

networks and Levinson as detailed above nowhere discloses neural networks, the subject matter

of claim 8 is submitted to be allowable over Levinson separate from dependency from claim 1,

now believed to be in allowable form. Should the rejection of claim 8 be maintained, it is respectfully requested that the relevant teachings of Levinson be recited with greater clarity.

Claim 9 which depends from claim 8 details a hidden layer intermediate between input values and the optimal physical crystallization parameter. As such a hidden layer is neither taught nor contemplated in Levinson, claim 9 is submitted to be allowable over Levinson separate from ultimate dependency to claim 1, now also believed to be in allowable form.

Claim 14 recites attempting crystal growth based on the optimal physical crystallization parameter determined through function training. As Levinson does not provide to the user an output of an optimal physical crystallization parameter and instead only approaches such a concept as summarized in claim 2 found on page 17 of that reference, Applicant submits that training of the function to produce an optimal predicted theoretical value and attempting crystal growth based on single optimal value as opposed to a range of values per Levinson represents a patentable distinction for pending claim 14 separate from dependency from claim 1, now believed to be in allowable form.

Claim 18 recites the conversion of the plurality of crystallization experimental samples to vectors prior to training of the predictive crystallization function. Levinson is submitted to be wholly silent as to the subject matter of claim 18 and as such this represents a basis for the patentability of claim 18 separate from dependency from claim 1. Should the rejection of claim 18 be maintained, it is respectfully requested that the relevant teachings of Levinson be recited with greater clarity.

Claim 19 recites the conversion of the plurality of crystallization experimental samples to vectors prior to training of the predictive crystallization function. Levinson is submitted to be wholly silent as to the subject matter of claim 19 and as such this represents a basis for the patentability of claim 19 separate from dependency from claim 1. Should the rejection of claim 19 be maintained, it is respectfully requested that the relevant teachings of Levinson be recited with greater clarity.

Independent claim 21 has in common with independent claim 1 the notion of "training a predictive crystallization function" and as such the above remarks with respect to independent claim 1 in regard to training attributes of the claimed predictive crystallization function are incorporated herein by reference. Additionally, claim 21 recites the determination of an optimal physical crystallization parameter for a known crystallant with the storage of such information along with physical properties in a classification system and comparing an unknown crystallization sample to the classification for the known crystallant.

Applicant submits that no comparable teaching can be found in Levinson as to the subject matter recited above with respect to claim 21. While the outstanding rejection states that "Levinson 167 teaches a system not just a process, but a system that is more than capable of handling the process put forth by applicants ...", Applicant submits that this perspective reading of Levinson does not satisfy the legal requirements of an anticipatory reference. As such, it is submitted that claim 21 and claims dependent therefrom are patentably distinct. Should the rejection of claim 21 as anticipated by Levinson be maintained, it is respectfully requested that specific teachings within Levinson relevant to the process steps delineated in claim 21 be stated with greater specificity.

Applicant submits that the subject matter of dependent claims 22, 24, 25, 26 and 29 also lack an anticipatory teaching or indeed contemplation within Levinson. As such, these claims are submitted to delineate patentable subject matter separate from dependency from claim 21, now believed to also be in allowable form. Should the rejection of claims 22, 24, 25, 26 and 29 as anticipated by Levinson be maintained, it is respectfully requested that specific teachings within Levinson relevant to the process steps delineated in claims 22, 24, 25, 26 and 29 be stated with greater specificity.

Claim 33 recites a neural network having been trained through analysis of a plurality of crystallization experiments to predict optimal crystallization conditions for a protein. Levinson is cited with regard to independent claim 33 as teaching a neural network with respect to Fig. 3 as capable of training. Applicant submits that the closest analogy to a neural network is an analysis cluster cited with respect to reference numeral 602 in Fig. 6. A reading of Levinson paragraph [0156] indicates that the analysis cluster provides no teaching of a neural network but rather a dual CPU computational system. As such, claim 33 as well as claim 34 which is dependent therefrom are submitted to be novel relative to Levinson.

Independent claim 35 relates to a system for crystallization parameter optimization exclusive of a trainable predictive crystallization function. Applicant hereby incorporates by reference the above remarks made with respect to claim 1 in regard to this aspect as well as use of independent and dependent variables to determine the optimal crystallization parameter. For these reasons, claim 35 and those claims that depend therefrom are submitted to be novel over Levinson.

In light of the above amendments and remarks, reconsideration and withdrawal of the rejection as to claims 1-16, 18, 19, 21-29, 31 and 33-50 under 35 U.S.C. §102(e) as anticipated by Levinson is requested.

Remarks Directed to Rejection of Claims 33-50 under 35 U.S.C. §102(b) as Anticipated by Gester

The basis of the rejection is that the system of Gester is capable of functioning per pending claims 35-50, and that the logical aspects of the system are not relevant to patentability (Paper No. 02232006).

Applicant submits that the system limitation of claim 35 with respect to:

> an incomplete factorial screening program having a trainable predictive crystallization function through the analysis of a plurality of crystallization experimental samples with said plurality of physical characterization input variables being independent training variables and an outcome or score for each of said plurality of crystallization experimental samples being dependent variables

is entitled to patentable weight. The inability to find a comparable feature within Gester indicates that this is an improper anticipatory rejection. Additionally, the assumption that the system of Gester is capable of performing according to the system of claim 35 is not only conjecture, but inconsistent with the teachings provided in the instant specification, Example 1, for a system corresponding to that of claim 35.

To dismiss differences in logic associated with an automated system is submitted to be an improper recasting of the pending claim and constitutes an improper examination function.

In light of the above amendments and remarks, reconsideration and withdrawal as to the rejection of claims 35-50 under 35 U.S.C. §102(b) as anticipated by Gester is requested.

Remarks Directed to Rejection of Claims 17, 20 and 30 under 35 U.S.C. §103(a)

Applicant submits that claims 17 and 20 are patentable on the basis of dependency from claim 1, now believed to be in allowable form. Likewise, claim 30 is believed to be allowable based on dependency from independent claim 21. Additionally, it is respectfully submitted that the prior art reference combination fails to afford the claimed invention on the basis of the above remarks with respect to lack of teaching within Levinson as to a neural network. Further, it is submitted that a *prima facie* obviousness rejection has not been adequately articulated as to the motivation for the implementation of a Chernov algorithm or Bayesian type algorithm as such algorithms provide a set of basis multiplying functions for each input variable and such algorithms were submitted to be a misplaced choice based on the apparently progressive processing taught by Levinson (see paragraph [0151]).

In light of the above amendments, reconsideration and withdrawal of the rejection as to claims 17, 20 and 30 under 35 U.S.C. §103(a) over Levinson in view of admitted prior art is requested.

Summary

With this amendment, claims 1-31 and 33-50 remain pending for consideration. Claims 1 and 35 have been amended and claim 52 canceled. Each claim is believed to be in allowable form and directed to patentable subject matter. Reconsideration and withdrawal of the outstanding rejections is requested. Should the Examiner have any suggestions as to how to

improve the form of any of the pending claims, the Examiner is respectfully requested to contact

the undersigned attorney in charge of this application to resolve any outstanding issues.

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Respectfully submitted,

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